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ABSTRACT

The materials in this educational packet are designed for use with students in grades 4 through 7. They consist of an overview, teaching guides and student data sheets for three activities, and a poster. The overview stresses the significance of wetland habitats in all 50 states. The needs of wildlife and humans are also considered in respect to wetlands development and use. A glossary and list of reference materials are included. The teaching guides contain a list of learning outcomes, instructional strategies, a list of materials needed, and an activity review sheet (with answers). In the activities, students: (1) go on a field trip to survey values of a local wetland; (2) examine different sides of issues surrounding wetland uses in their state as they develop "campaign platforms;" and (3) write, produce, and circulate a newspaper focusing on wetlands conservation and use. The poster provides an illustration of wetland species and pie charts demonstrating wetland habitat loss since the 18th century. In addition, other activities are provided in which students make a word puzzle and try it out with their classmates and determine what will grow from a small sample of wetland soil collected during the wetland field trip. (JN)

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Wetlands Conservation and Use

Issue Pac

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A Message To Educators

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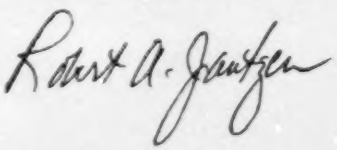
This education package represents an important step in our efforts to provide teachers and other educators with factual information about wildlife, habitat, and resource management. We hope that you find these materials useful and that you will encourage your students to learn more about America's wildlife heritage.



Robert A. Jantzen
Director
U.S. Fish and Wildlife Service

These materials are designed for use with students in grades four through seven.

Contents

Leader Overview
This Overview stresses the significance of wetland habitats in all 50 States. The needs of wildlife and humans are considered in respect to wetlands development and use. What are the trade-offs? Boldface words are explained in the Glossary; additional materials are listed under Resources.

Poster: Side 1
This poster illustrates the beauty of a wetland area. The presence of several wildlife species demonstrates one of the major values of wetlands.

Poster: Side 2
A series of pie graphs demonstrates wetland habitat loss since the 18th century.

Student Page 1: Wetlands Hide and Seek
Students make a word puzzle and try it with their classmates.

Student Page 2: What Grows Here?
A small sample of wetland soil is collected on the field trip and brought indoors to see what grows.

Activity 1: Rate a Wetland
Wetland areas have many functions and uses. On this field trip, students survey values of a local wetland.

Activity 2: Wetland Politics
Issues surrounding wetland uses are varied and complex. Students will see different sides of these issues and learn about wetland programs in their State as they develop "campaign platforms."

Activity 3: The Wetlands Gazette
Newspapers are an important medium for discussion, reporting issues, and transmitting information. The Wetlands Gazette provides a forum for wetland news and local concerns.

Note: Other Wetlands Pacs in the Fish and Wildlife Service's Outdoor Classroom Series include Rivers and Streams, Beaches, Freshwater Marshes, Estuaries and Tidal Marshes, and Hardwood Swamps.

These materials are designed for use with students in grades four through seven.

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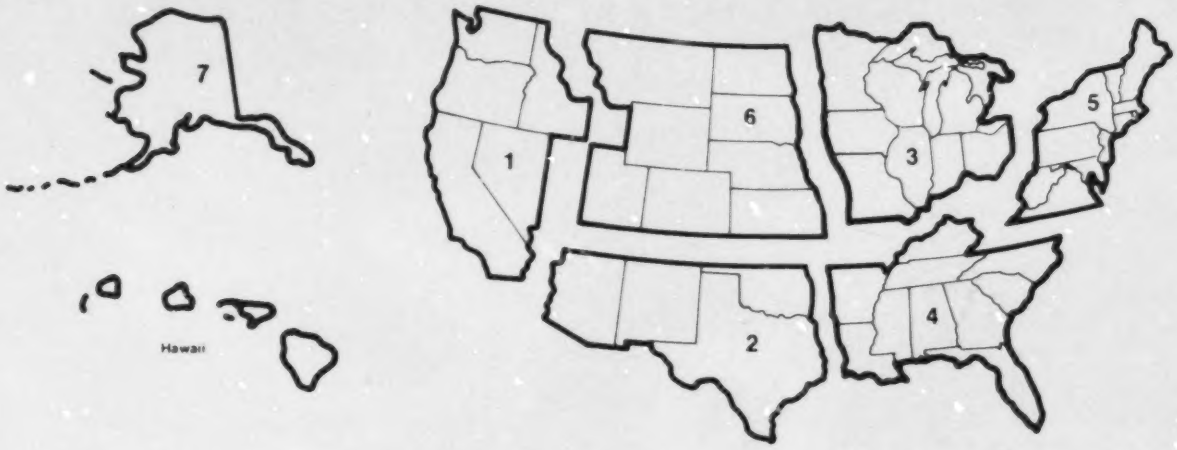

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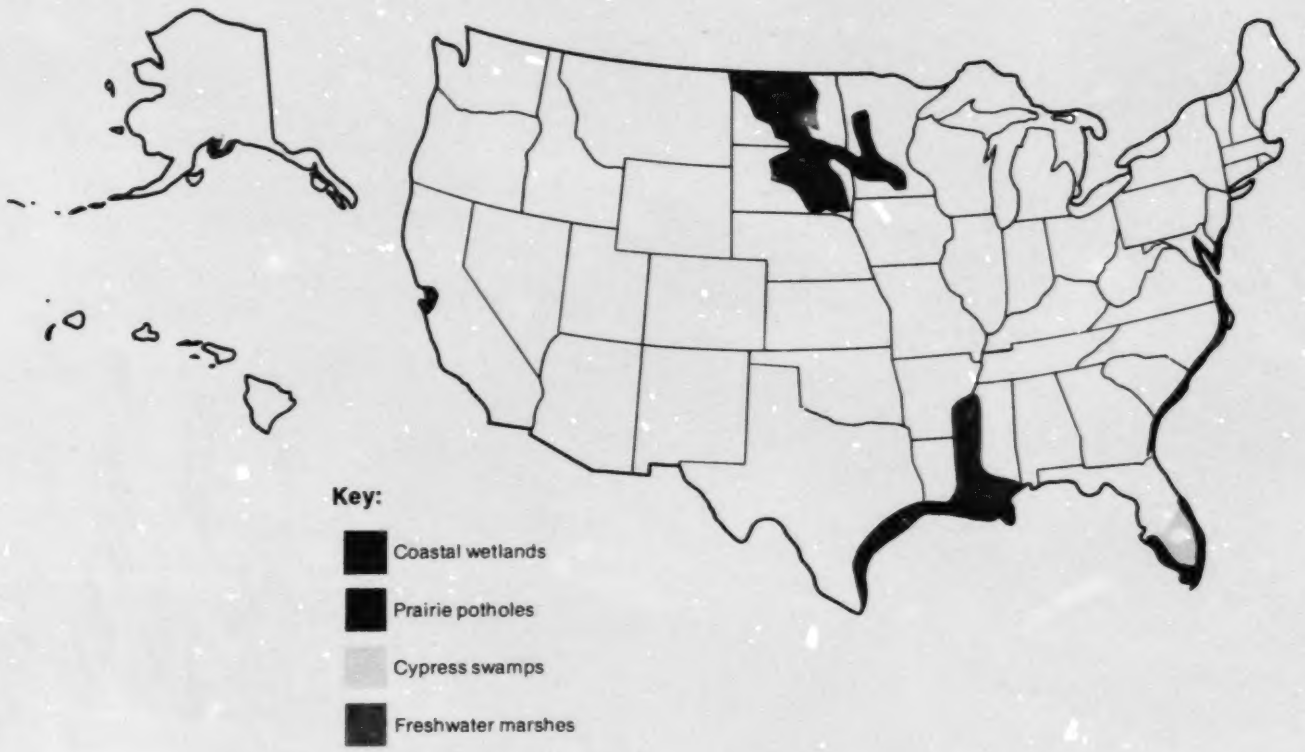
Important Wetland Areas in the United States:



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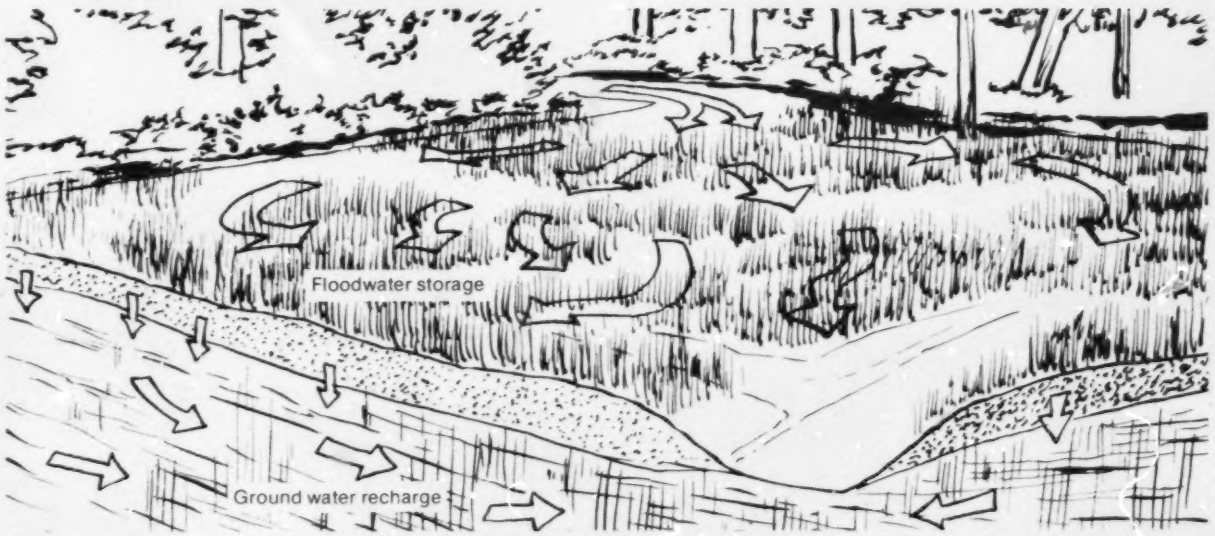
Wetlands Conservation and Use

Leader Overview



Water purification

"A dawn wind stirs on the great marsh. With almost imperceptible slowness it rolls a bank of fog across the wide morass. Like the white ghost of a glacier the mists advance, riding over phalanxes of tamarack, sliding across bog meadows heavy with dew. A single silence hangs from horizon to horizon."

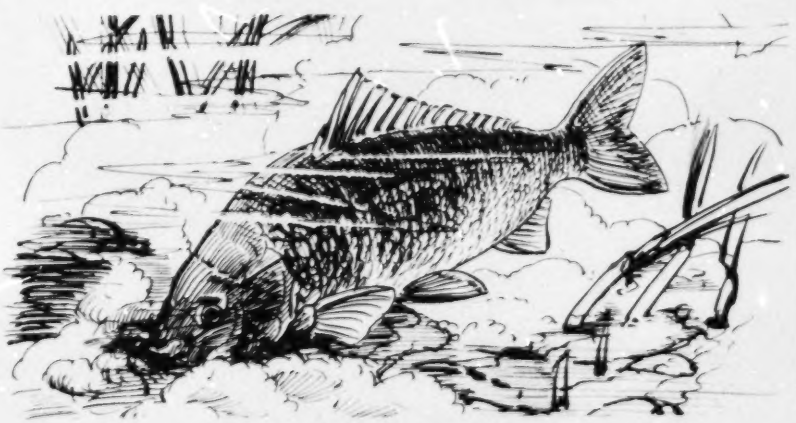
—Aldo Leopold
A Sand County Almanac

This peaceful beauty is only one of many wetland values.

Wetland Characteristics

Wetlands are places of interface between land and water. Though they may be flooded only occasionally during spring thaw or daily by the cycle of tides, water is the key feature controlling the life of the wetland ecosystem. Unique **hydric** soils and plants adapted to living in water-saturated conditions characterize wetland areas. Common names for different types of wetlands are swamps, bogs, freshwater or salt marshes, potholes, and sloughs.

These wetland systems have inherent natural values. They provide nursery and breeding grounds for fish, shellfish, waterfowl, and other wildlife. The highly productive wetland plants are the primary food source for these animals. Wetlands perform important **hydrologic** functions including water purification, **groundwater recharge,** and flood and erosion control. Unfortunately, these values went unnoticed for a long time while "worthless" wetlands were destroyed in efforts to "improve" them. The following table summarizes the benefits of natural wetlands to wildlife and people and the uses of developed wetlands.



Functions/Uses	Natural Wetlands	Developed/Drained Wetlands
Wildlife Habitat	• Provide essential nesting, feeding, and wintering sites for waterfowl. • Provide food, water, and cover for many species of game and fur-bearing animals. • Provide breeding or nursery grounds for many species of fish and shellfish (including 2/3 of the commercial species).	• May support a different type of flora and fauna, but not generally wetland species. The problems of wetland destruction first became noticed due to a dramatic decline in populations of ducks and geese.
Water Resource Values	• Provide water purification because wetland plants and soil organisms absorb or break down many pollutants. Researchers are examining wetland use for wastewater treatment. • Recharge groundwater. Water held in wetlands may seep down to replenish the water table. • Provide flood and erosion control by temporarily storing excess water.	• Cause loss of water resource values after which deterioration of water quality or increased flooding may result. • Often requires construction of alternative solutions such as levees, dams, and treatment plants to replace formerly "free services."
Food Crops/ Productivity	• Provide food for people and other animals such as fish, shellfish, and waterfowl. Many wetlands are highly productive, with more plant growth per **hectare** than farmland. • Furnish areas for commercial crops such as cranberries, wild rice, and marsh hay.	• Usually easier to farm through small potholes than go around them. • Often result in soil destruction and loss of soil fertility; however, wheat, soybeans, and other crops may grow well in drained wetlands.

Indirect Human Impacts

In addition to the direct impacts of filling and draining, people have indirect impacts on wetlands. Industrial cooling water discharged into wetlands raises water temperature (heat pollution), sometimes killing animals or changing their life cycles. Wetlands are polluted by spills, discharges, or runoff of oil or chemicals.

The introduction of nonnative species, which have few natural enemies, also affects wetlands. For example, carp, a native fish of Asia, has thrived in many U.S. freshwaters. This fish "roots" in the bottom for food, raising clouds of sediment that can cause a variety of problems. For instance, this disturbance clouds the water, thus reducing light penetration. This in turn may cause a decrease in photosynthesis, which eventually reduces the amount of oxygen available to plants and animals.

A second example of problems with introduced species is the purple loosestrife plant . It was brought into the United States in the early 1800's by a garden club and is taking over habitat once occupied by cattails. While some people consider purple loosestrife attractive, it is less nutritious than cattails. Ultimately, this affects food relationships in those wetlands dominated by purple loosestrife.

Choosing Priorities

Development of wetlands often impairs or destroys their natural functions. Before people became aware of these functions, filling, draining, or dumping on wetlands seemed the only way to make them useful. Now comes a need for careful balance. Does developing a wetland have more value than leaving it alone? The answer is not always simple.

Certainly different sites can be found for garbage dumps. But wetlands destruction is also spurred by the demand for jobs, food, and homes. Wetlands are drained for agriculture or filled for cheap, flat residential land or prime waterfront property. How are these values to be balanced?

Wetland Protection and Planning

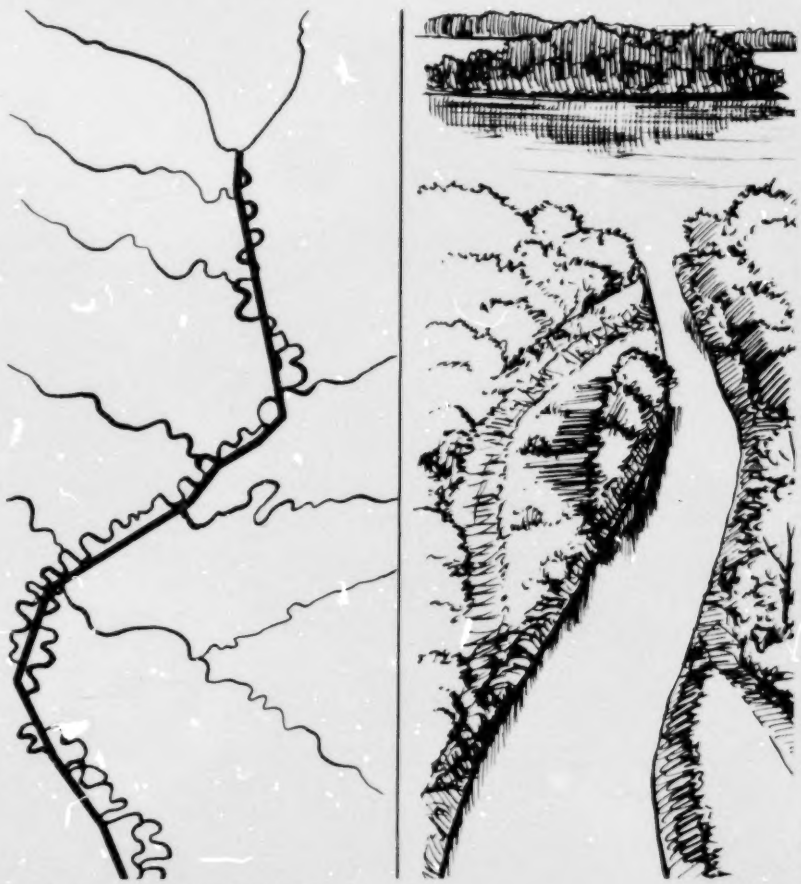
The first wetland protection programs were aimed at preserving wetlands important to wildlife, particularly to migrating birds. Federal and State agencies purchased wetlands or **easements** on them through the Waterbank or Migratory Bird Conservation Programs. Private agencies (such as The Nature Conservancy, Ducks Unlimited, and others) added to the conservation effort.

Increasing public realization of wetland values has led to broader programs for planning and preservation. The Clean Water Act requires permits for some wetland dredging or filling projects. The permit evaluation process ensures that public losses as well as benefits from proposed projects are considered. The Coastal Zone Management Act encourages States to consider development trade-offs in coastal wetlands. Many States have laws or public land management policies affecting wetlands; some offer tax relief programs for owners of wetlands.

Learning to Plan

Planning for wetland use and conservation requires knowledge of how wetland systems function. Research is now providing some needed information. Unfortunately, some lessons have been learned through hard experience. For example, some soils drained for agriculture were too acid or too salty for crops. Draining of prairie **potholes** has decreased waterfowl populations. Building sites located on former wetlands are often subject to recurring floods or storm damage.

A case in point is the **channelization** of the Kissimmee River, which flows into Lake Okeechobee in southern Florida. In the mid-1960's, this 100-mile-long meandering river was straightened into a 50-mile canal to drain and control floods on surrounding land. Soon water quality in Lake Okeechobee, the drinking water reservoir for the southern part of the State, began to deteriorate. What happened? Prior to channelization, the flowing water was slowed and filtered in the winding river and the adjacent wetlands. After channelization, runoff from adjacent farms and grazing land flowed quickly



Channelization of the Kissimmee River

and directly into Lake Okeechobee without benefit of the natural pollution removal. The river and marsh may now have to be restored to accomplish this important function.

Habitat Management

Planning for wetland uses is often an either/or trade-off decision because wetlands cannot be managed both for development and for natural values.

Preservation of wetlands is important to maintaining its wildlife values and, in most cases, proper management can enhance wetland habitat. **Moist soil management** can be used to control marsh plant populations wherever water levels can be manipulated. For example, water levels may be "drawn down" in spring, allowing plants to grow in areas that were formerly flooded. Reflooding these areas in the fall makes the food available to migrating waterfowl. Plantings and nesting boxes may be located where food or nest sites are insufficient.

Plans for development should not assume that wetland areas are useless. Wetlands are proving more and more to be invaluable resources. Their further loss would be both costly and sad, as so eloquently described by Aldo Leopold:

"Some day my marsh, dyked and pumped, will lie forgotten under the wheat, just as today and yesterday will lie forgotten under the years. Before the last mud-minnow makes his last wiggle in the last pool, the terns will scream goodbye . . . the swans will circle skyward in snowy dignity, and the cranes will blow their trumpets in farewell."

Our increased knowledge and appreciation of the wetlands' natural "work and worth" can help ensure their presence for future generations to enjoy.

Glossary

channelization—A process by which people modify the shape and course of a streambed to provide a more direct waterflow.
easement—Legal rights (for a nonowner) written into a real estate deed for a specific purpose—such as wetlands protection activities.
groundwater recharge—Replenishment of the underground water supply.
hectare—Measurement of area in the metric system; 1 hectare (10,000 sq m) = 2.47 acres.
hydric—A term used to describe particular types of soils formed under wet conditions.
hydrologic—A term pertaining to water—its properties, distribution, or circulation.
moist soil management—The process of controlling water levels in a marsh so that natural wild foods are abundantly produced for wildlife.
pothole—A shallow, water-filled depression of glacial origin found primarily in the northern Great Plains. Potholes characteristically have cattails, grasses, and abundant aquatic life.

Resources

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Department of the Interior/U.S. Fish and Wildlife Service, 1982

Wetlands Conservation and Use

Activity 1 — Rate a Wetland

Purpose

Students will inventory uses of a local wetland. They will discover the values of undisturbed wetlands and reasons why wetlands are developed or changed.

Learning Outcomes

After completing this Activity, students will be able to:

A. List three functions of wetland areas.

B. Distinguish between activities (values) dependent on wetlands and activities that could be located elsewhere.

C. Conduct a field survey of wetland uses.

Organization

Who: Students in pairs or small groups

Where: Wetland area

When: Spring, summer, or fall

Time: 3 to 5 hours; longer if you choose to expand the Activity—see Introduction.

Safety: Observe all safety precautions near water and in the wetland. **a.** Buddy system: Organize students in buddy teams and explain water safety responsibilities. **b.** Extra supervision: 1 adult for every 10 students. **c.** Bogs: Some bogs have floating mats of vegetation that can give way. A field trip to a bog, therefore, is discouraged.

Materials: For Each Group

- Cheesecloth
- Plastic scoop or cup
- Insect repellent (optional)
- Hand lens or magnifying glass (optional)
- Camera and film (optional; instant processing preferred). Note: Use black and white film if photos are to be used in Activity 3.
- Maps of local area; e.g., from county land office, Soil Conservation Service, or U.S. Geological Survey (optional)

Materials: For Each Student

- Data Sheets and pencil
- Clipboard (Masonite or stiff cardboard with binder clip or paper clip)
- Old clothes and shoes

Introduction

This Activity involves student evaluation of a wetland area. You may choose the amount of time and detail devoted to the project. For the basic Activity, students evaluate one wetland using their Data Sheets.

To expand the Activity, ask students to evaluate and compare two or more wetlands and record their findings on maps.

Directions

1. Choose a site for the field trip. If you plan to survey just one wetland, choose one with as much variety as possible (e.g., one that has both natural and disturbed areas). If you will survey more than one wetland, choose different kinds (e.g., open marsh vs. wooded swamp, or developed vs. undisturbed).

2. Prior to the field trip, ask the class if they know of any wetlands nearby. Have they ever visited these wetlands? Did they enjoy their visits? What did students see in the wetlands and how are they used? What good are wetlands? Tell students they are going to conduct a survey to gather information on wetlands. For this they should wear old clothes and old shoes.

3. At the field site divide the class into pairs or small groups and distribute materials. Review safety procedures.

4. Let the students work in their groups to fill out their Data Sheets. How many uses of the wetland can they find? Would all the uses of the wetlands be easily seen? (No—for example, some of the water resource values are not evident just from looking at a wetland.) Students should record wetland uses by noting them on their Data Sheets and by taking pictures.

The following chart provides examples of considerations students might look for to demonstrate each value.

5. When students have finished the survey, list and discuss the wetland uses they found. How many uses were there? Did the students consider them valuable? How might they find out about uses they could not see? (For example, for water storage capacity, talk to a local hydrologist.) How many of these uses *depend* on the wetland (wildlife habitat, water filtering)? How many could occur somewhere else (waste dumping, many developments that require filling)?

6. If you surveyed more than one wetland, compare their uses. What are the value differences between undisturbed and modified wetlands? Let the students mark the location of each use on the maps. How close together are they? Do uses seem to conflict?

Wetlands Evaluation Chart

Wildlife Habitat	List animals, animal tracks, burrows or nests, food, and signs of animals eating.
Water Purification	Strain a mud sample through cheesecloth and examine organisms. This "living mud" helps break down impurities in the water. It may be further examined with a hand lens. Also look for sediments that have settled out of water in the wetlands (fine particles on the bottom, especially around vegetation).
Education	List wetland studies that can benefit society.
Recreation	List recreational uses of wetlands such as fishing, hunting, and birdwatching.
Open Space	Take photographs or make drawings of the area.
Esthetics	Take photographs or make drawings of plants and animals you find attractive.
Timber	Identify any commercial tree species (if you can); e.g., bald cypress—valued for its rot-resistant wood.
Food Plants	Examine wild cranberries, wild rice, wheat, or any agricultural plants that may be growing in developed areas.
Transportation	Watch for boats or docking facilities.
Waste Dumping	Look for garbage, sewage pipes, or other waste disposal outlets.
Filling and Draining	Look for construction operations that might include filling or draining.

Review Answers

1. Any answer from the Data Sheet is valid, or students may have discovered other uses during their surveys.

2. Many uses are wetland dependent: wildlife habitat, education, water resources. Waste dumps or developments that require filling or draining could often be located elsewhere.

3. c. A garbage dump would most noticeably change a wetland from its natural state, polluting it and eventually filling it in. The other uses may cause lesser changes and are also acceptable answers if students offer reasonable explanations.

4. False. Many of the wetland uses discussed are inherent to undisturbed wetlands.

5. There is no single correct answer to this question. Evaluate the students' answers in light of their explanations. A few students may support the dump. In that case you might develop a class discussion around the impact of trash on wetlands. If the new dump is *not* built in this location, how will the town handle the trash problem? Won't pollution occur anyway?

Wetlands Conservation and Use | **Activity 1** | **Activity Review**

Name:

1. Name three uses of wetland areas you saw on your field trip.

a. _____

b. _____

c. _____

2. Do any of the above uses *need* to be in a wetland area? Why?

_____

_____

_____

3. Which one of the following uses would most noticeably change an undeveloped wetland? (Circle the letter.)

a. Wildlife habitat

b. Recreation

c. Garbage dump

d. Growing cranberries

4. Is the following statement True or False? (Write the answer in the space provided.)

_____ Natural wetland areas have little value and must be developed to be useful to people.

5. Pretend you live in a town whose population is growing fast. The town's old dump will not be able to handle the amount of trash much longer. In order to be able to dispose of the town's trash in the future, the town plans to build a new dump in a nearby wetland area. Would you support the dump in this location? Explain your answer.

_____

_____

_____

_____

_____

Department of the Interior/U.S. Fish and Wildlife Service, 1982

Wetlands Conservation and Use

Activity 2 **Wetland Politics**

Farms and Wildlife—Can we provide both?

Purpose

Issues surrounding wetlands and their uses are diverse and controversial. This Activity will emphasize that many priorities must be considered when assessing the values of a particular wetland.

Learning Outcomes

After completing this Activity, the students will be able to:

A. List three values of wetlands.

B. Write a speech addressing one wetland issue.

C. Evaluate trade-offs that exist between the needs of people (society) and the needs of wildlife.

Organization

Who: Three groups of equal size that make up half the total; a fourth group that makes up the other half. (Note: This Activity can involve 30 to 70 students.)

Where: Meeting room and library

When: Any time of year

Time: Several 1-hour periods

Materials: For the Class

- Paper and pencils
- Construction paper and poster material
- Magic markers or crayons, assorted colors
- Tape, paste, and/or staplers
- Scissors

Directions

1. Explain to the group that they are going to participate in a mock election. Students choose a candidate based on their views (party platform) concerning wetlands and their uses.

2. Base the campaign as much as possible on issues relevant to your State or local area. Most States have some current or pending wetland legislation or planning programs. Write or call your State Legislator or Department of Natural Resources (DNR) for copies or synopses. Another excellent source of information on local issues would be an Environmental Impact Statement concerning a development project involving wetlands in your State. Besides technical information, these documents usually contain summaries of the wetlands' values, development issues, and alternatives.

Outline the major points of the documents

- General: What are the values of the wetlands?
- Legislation: Which wetland uses are restricted? How? Which wetland uses are allowed?
- Impact Statement: What type of development is proposed? What are the other choices? What are the effects on wetlands, wildlife, and people?

Discuss with the class where the document came from. Who regulates, evaluates, or plans for wetlands in your State?

If you want to broaden student concepts of the election process, let the campaign be as detailed and realistic as possible. Students may make posters, run polls, appoint election judges, etc.

3. Invite an elected local government official or wildlife manager to talk to the group. The person might address a number of topics: local wetlands today; local wetlands yesterday; problems local government faces in administering wetland areas; flood plain zoning; administration of wildlife needs on local wetlands; the political process; and others.

4. Let the group organize two or three political parties and an electorate, with duties as described below. Each party will promote a candidate and develop a platform based on whether they would pass, change, or reject a State Wetlands Bill, planning program, or the proposed action in the Impact Statement. Party organization depends on the type of material the group will debate. There may be two parties (pro-wetlands preservation and pro-wetlands development) or three parties (each supporting a different choice proposed in a planning program or Impact Statement).

Each party should choose a name reflecting the party's philosophy and then develop a platform. They may use information from the Law or Impact Statement, the first Activity, the class speaker, library research (see Resources), and interviews with other people in the community. The party platforms should concern themselves with community water needs, recreation, wildlife benefits gained or lost, agricultural needs, and local industrial and housing needs.

Each party chooses a candidate to represent its views. There should be a nominating speech, several seconding speeches (representing the viewpoints of farmers, industrialists, sporting groups, developers, or others), and acceptance speeches (promoting the party platform) for each candidate. The campaign can continue with posters, buttons, etc.

5. The voters will organize and moderate the election process. They should prepare ballots with candidates' names and synopses of their positions. They should set up a question-and-answer forum and research a list of questions to ask the candidates. They may set up polling places and voting procedures.

6. All students may vote on election day according to their established procedure. Whoever counts the votes should announce the winner.

7. Discuss the election process and results. Ask the students whose arguments influenced them the most. Whose arguments influenced them the least? Why? How might the different platforms have been strengthened? Also, discuss why these choices about wetlands must be made. Different wetland uses are often not compatible. What is lost or gained as a result of different choices?

Review Answers

1. Evaluate this answer based on the group's "political structure."

2. Use this opinion question to develop a discussion on the election issues and the effectiveness of the campaign.

3. Let the groups share their slogans. Ask for improvements or corrections with given reasons.

4. Many wetland uses are incompatible and once a wetland is developed, it may no longer serve its natural functions.

5. Students will probably list the agency that provided the document used as a basis for the campaign. The State Legislature, Department of Natural Resources or other State agencies, and Federal agencies such as the U.S. Army Corps of Engineers or the U.S. Fish and Wildlife Service are possible answers.

Wetlands Conservation and Use

Activity 2

Activity Review

Name:

1. Your class has just completed an election campaign. What were the main points in each party's platform? Fill in the chart below. (You may need only two blocks.)

Party			
Platform			

2. Did your opinions about wetlands change during the campaign? Why? Why not?

3. You have decided to do volunteer work for one of the political parties you wrote down for question #**1**. Tell which one you would support and draw a button or bumper sticker (with a slogan) for it.

Name of Party_____

Slogan_____

Button

Bumper Sticker

4. Why do people need to make careful choices concerning developing or preserving a wetland?

5. What is the name of one group or agency that works on wetlands planning in your State?

Department of the Interior/U.S. Fish and Wildlife Service, 1982

Wetlands Conservation and Use

Activity 3 **The Wetlands Gazette**

Western grebe—courtship dance

Purpose

Wetland areas in the United States are rapidly declining. This group Activity will increase student awareness of wetlands values.

Learning Outcomes

After completing this Activity, the students will be able to:

A. Initiate research, conduct interviews, and collect information on values of wetlands.

B. Identify three values of wetlands.

C. Write a story about one aspect of wetlands based on information from Objective A.

D. Write their feelings about a wetlands area.

Organization

Who: Groups of 3 to 5 students

Where: Wetland, classroom, and community

When: Any time of year

Time: 1-hour periods for 6 to 10 days; or longer if you prefer to expand the Activity—see Introduction.

Materials: For the Class

- Local newspaper
- Writing paper
- Pens/pencils
- Duplicating facilities

Introduction

Newspapers, despite competition from television and radio, are still the basic medium of public record and information. Producing a newspaper will provide students with valuable insight into this medium and allows development of interdisciplinary skills and studies.

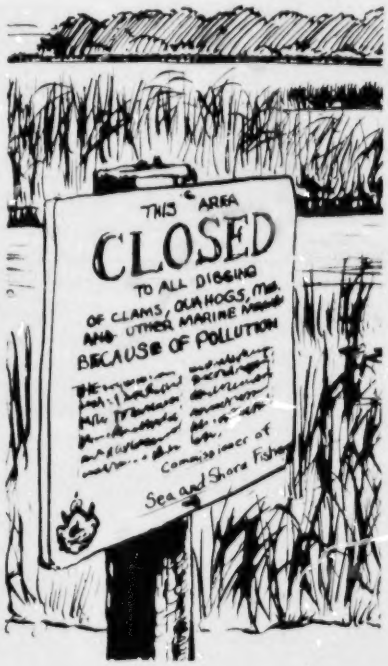
Wetlands conservation is a public issue that lends itself to exploration through a newspaper format. The extent of time allocated to this Activity can vary according to the amount of time you have and the enthusiasm of your group. Students may develop just a few stories based on information from Activities 1 and 2, or they may form several departments and gather more information through interviews and library research.

Directions

1. Following the field trip (Activity 1), explain to the group that they are going to write, print, and circulate a newspaper, The Wetlands Gazette. Discuss the need for various departments to be formed in order to produce a newspaper about wetlands and ask for suggestions. (Editorial,

advertising, sports, local news, art, and food sections are all good examples.)

2. Study the local newspaper with the group. You might also arrange to take a trip to local newspaper offices or invite a news media representative to speak to the students. This will allow them to see how complex the news-gathering process is—from ideas for a story, interviews, and other news-gathering techniques, to the actual writing of the story. If your local school has its own newspaper, consult the staff for resources and advice, or invite the staff to work with you to produce The Wetlands Gazette.



3. Before students settle into their news assignments, review what they saw and discussed while at the wetlands and also the issues involved in their election campaigns. Then organize the students into four or more news departments. Ask each department to discuss types of stories and headlines they can write. Each department may produce more than one news item. Illustrations should accompany the stories. (Photographs from Activity 1 could also be added. Only glossy black and white prints can be printed in the newspaper; color photos do not reproduce well.)

Department	Sample Topics
Editorial	Value of Preserving a Local Wetland Value of Developing a Local Wetland Letters to the Editor
Advertisement	Help Wanted Ads for Wetland Jobs (Technician, Water Pollution Tester, or Dragline Operator) For Sale Ads of Wetland Products (baskets, muskrat pelts, cranberries, etc.)
Sports	Outdoor Column Sport Fishing News; e.g., headline—"Fishing Good at Wye Marsh"
Local News	Interview with a senior citizen about local wetland changes; or interview with a hunter or birdwatcher; e.g., headlines—"Birdwatchers Spot Rare Bird" or "New Nesting Boxes Placed in the North Marsh"
Food	Local Interest Column; e.g., headline—"Local Clams Unfit to Eat Because of Pollution" Recipes using wetlands plants and/or animals; e.g., Local Delicacies: cranberry sauce; muskrat stew; watercress soup or salad
Art/Culture	Logo for the newspaper Drawings to illustrate some stories Poems describing wetlands Theme and program for a local Outdoor Art Exhibition Cartoons

4. If the planned scope of your newspaper requires it, discuss what further information students will need and let reporters from each department develop a plan for gathering it. Suggestions for plans include: research in local publications or the library; and interviews with senior citizens, people who hunt or fish, local land or water quality managers, and city officials. For longer term projects, set copy deadlines.

5. Proceed with newspaper production according to the plan. If possible, arrange for the students' stories to be typed (e.g., by students, parents). Duplicate the students' work. Let the class put the newspaper together.

6. A Circulation Department from the group should develop a plan to distribute the newspaper locally—in schools, or perhaps also in the community. Distribute the paper according to the plan. Contact the local newspaper and see if the editor will print one or two of the better stories.

Followup

Follow the fate of a piece of paper from its beginning in the forest or wetland, to paper pulp, to the newspaper stand, and eventually to the recycling bin. Does the production of the paper itself have any effect on the wetland they studied?

Obituary column—Death of a wetland

Review Answers

1. Answers depend on how the newspaper was organized. Possibilities include editorial, sports, food, and advertisement departments.

2. Again, answers vary with the kinds of articles produced. They might include recreation, wildlife habitat, water resources, etc.

3. Responses can include visits to libraries, newspaper offices, research institutes, universities, etc; conducting interviews with officials, local inhabitants, etc.

4. This question can provide the nucleus for a group discussion. Why did the students choose their particular stories? What story was the most interesting? (The discussion will vary with the particular stories featured in The Wetlands Gazette.)

5. Examples of headlines include:

a. "Duck and Deer Hunting Threatened in Swamp by Housing Plans."

b. "Housing Development at Jones' Marsh Generates New School Revenues for Science Addition."

Wetlands Conservation and Use | **Activity 3** | **Activity Review**

Name:

1. Your group has just finished writing The Wetlands Gazette. Name three departments you formed to produce your newspaper.

a. _____ b. _____ c. _____

2. Name one value or use of wetlands described by each of the departments you listed:

a. _____

b. _____

c. _____

3. As a reporter for The Wetlands Gazette, you want to write a story about pollution in a local wetland. Where can you gather information for the story?

_____

_____

_____

4. Briefly describe the story from The Wetlands Gazette that best explains what you think is the most important value of wetlands. (Continue on the back of the paper.)

_____

_____

_____

_____

5. A housing development company wants to buy and drain the local swamp. Write two headlines:

a. For a sports section that would interest hunters who want to keep the swamp.

_____

b. For a schoolboard meeting discussing the possible housing project and the new families who would move into the community.

_____

Wetlands Conservation and Use **Activity 1** **Data Sheet**

Name:

The first column on this sheet lists many uses or values of wetlands. Not all wetlands have all these uses, but you will find evidence of many. Read the uses in column 1; for each use, answer the questions at the top of columns 2, 3, and 4.

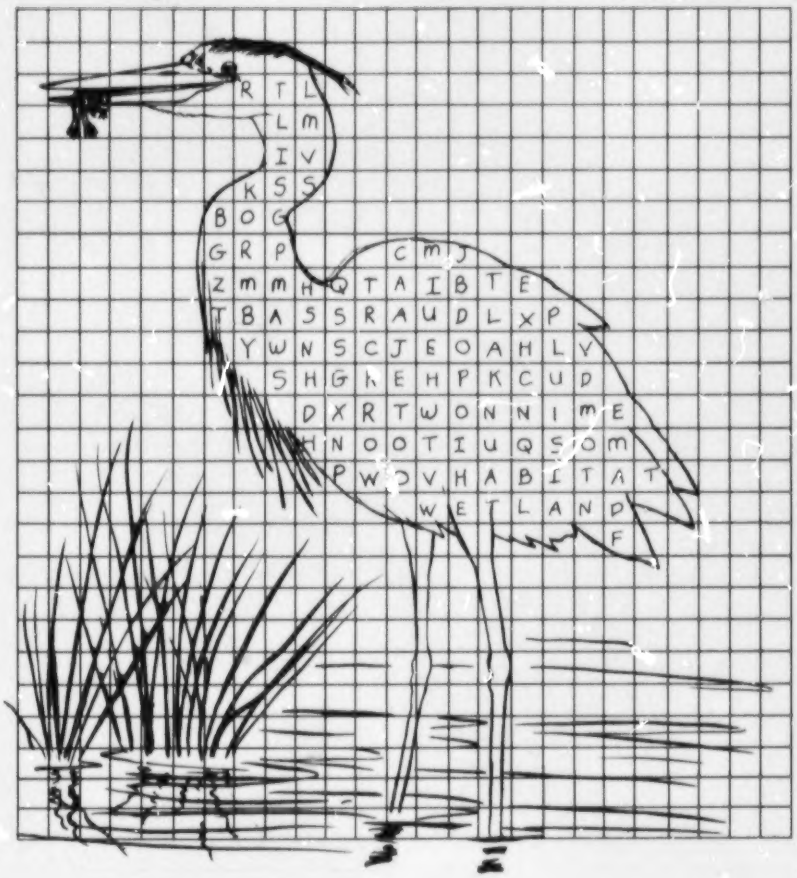
1 **Wetland Use**	2 **What evidence of use can you see in your wetland?**	3 **Does this use change the wetland? How?**	4 **Does this use belong only to wetlands?**
Wildlife Habitat -Birds -Fish -Mammals -Insects			
Water Purification			
Water Storage			
Recharging Underground Water			

Name:

1 **Wetland Use**	2 **What evidence of use can you see in your wetland?**	3 **Does this use change the wetland? How?**	4 **Does this use belong only to wetlands?**
Education			
Recreation			
Open Space/ Beauty			
Timber			
Transportation			
Food Plants/Animals			
Waste Dumping			
Filling			
Draining			

Wetlands Hide and Seek

Name:



This heron has swallowed more than a few frogs! All the words listed below make a word puzzle hidden inside the outline of the bird. Make your own Wetlands Hide and Seek Puzzle to share with your classmates or family.

Words used in the puzzle:

MINNOW—a small fish
BASS—a large fish
REED—a wetland plant
WETLAND—a land frequently covered with water
BOG—a type of wetland
MARSH—a type of wetland
SWAMP—a kind of wetland where trees grow
MANGROVE—a tree that grows in saltwater swamps
MOSQUITO—a flying, blood-sucking insect
HABITAT—a natural area that is "home" for animal species
PEAT—dead material that forms in a bog
DUCK—a water bird
SILT—very fine dirt that settles out of a stream or lake
POTHOLE—a small, shallow wetland area in the north-central States; caused by glaciers
CLAM—an edible shellfish found in salt marshes or freshwater creeks
CATTAIL—a tall marsh plant

Make your own puzzle

Directions

1. In the space on the right or at the top of the puzzle grid on Student Page 2, list all the words you will hide in the puzzle. They should have to do with wetlands and the wildlife living there. (Or you can use the same words printed above.)

2. Draw a wetlands scene outline on the grid and write the words inside the outline. They can be written up, down, forward, backward, and diagonally; some should crisscross.

3. Fill any empty squares with other letters. Add artistic touches to complete the picture.

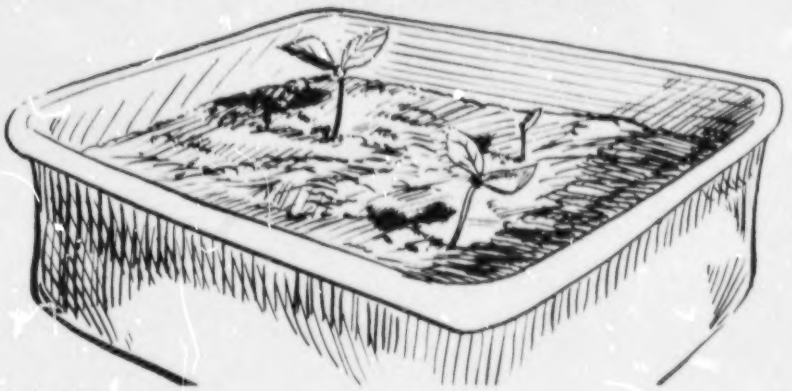
4. Ask someone to find all the words in your puzzle. (Be sure you keep the answer!)

What Grows Here?

Name:

When your group visits a wetland, bring home one small sample of soil. (Take along a small plastic container and lid from yogurt, margarine, or cottage cheese; make small holes in the top.) Scoop up a little marsh soil. An extra plastic bag helps to keep the soil moist on the return trip.

Keep your marsh soil well watered. Compare your marsh soil with a small piece of soil from the playground kept in the same way. What can you see growing? How soon? A marsh is a productive place!



Wetland sprouts

Grid